

- 15 -

5 What is claimed is:

1. An electrochemical cell having a solid cathode, an anode and an ionically conductive electrolyte activity the anode and the cathode, the
10 improvement in the cathode comprising:
a) a substrate; and
b) a cathode active material provided as a physical vapor deposited layer coated on the substrate.
- 15 2. The electrochemical cell of claim 1 wherein the substrate is flexible.
3. The electrochemical cell of claim 1 wherein the substrate is selected from the group consisting of titanium, stainless steel, nickel, tantalum, platinum,
20 aluminum, gold, and mixtures thereof.
4. The electrochemical cell of claim 1 wherein the cathode active material is selected from the group consisting of a metal, a metal oxide, a mixed metal oxide, a metal sulfide, a carbonaceous material, and
25 mixtures thereof.
5. The electrochemical cell of claim 1 wherein the cathode active material is selected from the group consisting of silver vanadium oxide, copper silver vanadium oxide, manganese dioxide, titanium disulfide,
30 copper oxide, chromium oxide, copper sulfide, iron sulfide, iron disulfide, cobalt oxide, nickel oxide, carbon, fluorinated carbon, and mixtures thereof.

- 16 -

5 6. The electrochemical cell of claim 1 wherein
the anode comprises a Group IA metal.

 7. The electrochemical cell of claim 1 wherein
the anode comprises lithium.

 8. The electrochemical cell of claim 1 wherein
10 the electrolyte solution operatively associated with the
anode and the cathode comprises an ion-forming alkali
metal salt dissolved in a nonaqueous solvent, wherein
the alkali metal of the salt is the same as the alkali
metal comprising the anode.

15 9. The electrochemical cell of claim 8 wherein
the alkali metal of the anode comprises lithium and the
ion-forming alkali metal salt is selected from the group
consisting of LiPF_6 , LiAsF_6 , LiSbF_6 , LiNO_3 , LiBF_4 , LiClO_4 ,
 LiAlCl_4 , LiGaCl_4 , $\text{LiC}(\text{SO}_2\text{CF}_3)_3$, LiO_2 , $\text{LiN}(\text{SO}_2\text{CF}_3)_2$, LiSCN ,
20 $\text{LiO}_3\text{SCF}_2\text{CF}_3$, $\text{LiC}_6\text{F}_5\text{SO}_3$, LiO_2CCF_3 , LiSO_3F , $\text{LiB}(\text{C}_6\text{H}_5)_4$,
 LiCF_3SO_3 , and mixtures thereof.

 10. The electrochemical cell of claim 8 wherein
the nonaqueous solvent comprises at least one organic
solvent selected from the group consisting of
25 tetrahydrofuran, methyl acetate, diglyme, triglyme,
tetraglyme, dimethyl carbonate, 1,2-dimethoxyethane,
1,2-diethoxyethane, 1-ethoxy,2-methoxyethane, diethyl
carbonate, acetonitrile, dimethyl sulfoxide, dimethyl
formamide, dimethyl acetamide, propylene carbonate,
30 ethylene carbonate, γ -valerolactone, γ -butyrolactone,
N-methyl-pyrrolidinone, and mixtures thereof.

- 17 -

5 11. The electrochemical cell of claim 1 wherein a separator is provided between the anode and the cathode to prevent internal short circuit contact between them.

10 12. The electrochemical cell of claim 1 housed in a conductive casing comprising a material selected from the group consisting of titanium, stainless steel, mild steel, nickel, nickel-plated mild steel and aluminum.

15 13. The electrochemical cell of claim 1 wherein the anode comprises lithium anode active material in electrical contact with a nickel current collector and the cathode comprises silver vanadium oxide active material in electrical contact with a titanium current collector and wherein the anode and the cathode are activated with the electrolyte solution comprising 1.0M LiAsF₆ in a 50:50 mixture, by volume, of propylene carbonate and 1,2-dimethoxyethane.

20 14. The electrochemical cell of claim 1 wherein the coating of the cathode active material is characterized as a physical vapor deposition product having a thickness of from about 0.001 inches to about 0.4 inches.

 15. The electrochemical cell of claim 1 wherein the substrate has been cleaned and provided with a roughened surface texture prior to contact with the coating.

30 16. The electrochemical cell of claim 1 wherein the substrate is perforated.

5 17. The electrochemical cell of claim 16 wherein the perforated substrate supports cathode active material physical vapor deposited onto both of its sides to lock the cathode active material onto the substrate through the perforations.

10 18. The electrochemical cell of claim 1 wherein the anode comprises lithium, the cathode comprises silver vanadium oxide as the cathode active material physical vapor deposited onto the substrate comprising titanium and the electrolyte comprises LiPF_6 dissolved
15 in an organic solvent.

 19. A secondary electrochemical cell, which comprises:

- a) a casing;
- b) a negative electrode comprising a negative
20 electrode active material which intercalates lithium;
- c) a positive electrode comprising a positive electrode active material provided as a physical vapor deposited layer coated on a substrate, wherein the positive electrode active material is selected from the
25 group consisting of lithiated oxides, lithiated sulfides, lithiated selenides and lithiated tellurides of at least one selected from the group consisting of vanadium, titanium, chromium, copper, tin, molybdenum, niobium, iron, nickel, cobalt, manganese, and mixtures
30 thereof; and
- d) an electrodes activating the negative and positive electrodes housed in the casing.

- 19 -

5 20. A cathode of an electrochemical cell, which comprises:

 a) a substrate of electrically conductive material; and

 b) a layer of cathode active material supported
10 on the substrate, wherein the layer of cathode active material is characterized as having been deposited onto the substrate by a physical vapor deposition coating process.

15 21. The cathode of claim 20 wherein the substrate is flexible.

 22. The cathode of claim 20 wherein the substrate comprises titanium or aluminum or mixtures thereof.

 23. The cathode of claim 20 wherein the cathode
20 active material is selected from the group consisting of a metal, a metal oxide, a mixed metal oxide, a metal sulfide, a carbonaceous material, and mixtures thereof.

 24. The cathode of claims 20 wherein the cathode
25 active material is selected from the group consisting of silver vanadium oxide, copper silver vanadium oxide, manganese dioxide, titanium disulfide, copper oxide, chromium oxide, copper sulfide, iron sulfide, iron disulfide, cobalt oxide, nickel oxide, carbon, fluorinated carbon, and mixtures thereof.

30 25. The cathode of claim 20 wherein the coating of the cathode active material is characterized as a

- 20 -

- 5 physical vapor deposition product having a thickness of
from about 0.001 inches to about 0.4 inches.

26. The cathode of claim 20 wherein the substrate
has been cleaned and provided with a roughened surface
texture prior to contact with the layer of cathode
10 active material.

27. The cathode of claim 20 wherein the substrate
is perforated.

28. The cathode of claim 27 wherein the perforated
substrate supports cathode active material physical
15 vapor deposited onto both of its sides to lock the
cathode active material onto the substrate through the
perforations.